Write the 1st 3 terms & the general term

1. e^x $\quad 1+x+\frac{x^2}{2}+\dots+\frac{x^n}{n!}$

2. $\sin x$ $\quad x-\frac{x^3}{3!}+\frac{x^5}{5!}\dots+(-1)^n\frac{x^{2n+1}}{(2n+1)!}$

3. $\cos x$ $\quad 1-\frac{x^2}{2}+\frac{x^4}{4!}+\dots+(-1)^n\frac{x^{2n}}{(2n)!}$

4. $\ln(1+x)$ $\quad x-\frac{x^2}{2}+\frac{x^3}{3}\dots+(-1)^{n+1}\frac{x^n}{n}$

5. $\frac{1}{1-x}$ $\quad 1+x+x^2+\dots+x^n$

Apr 12-7:24 AM

22.

x	$f(x)$	$f'(x)$
0	2	5
4	-3	11

$$\int_0^4 f(x)\,dx = 8$$

$$\int_0^4 x\cdot f'(x)\,dx$$

$$\int u\,dv = uv - \int v\,du$$

$u=x \quad dv=f'(x)\,dx$

$du=dx \quad v=f(x)$

$$= x f(x)\Big|_0^4 - \int_0^4 f(x)\,dx$$

$$= 4f(4) - 0\cdot f(0) - 8$$

$$= 4(-3) - 8$$

$$= -20$$

Apr 12-8:00 AM

21. $f(x) = 9x^{2/3} + 3x - 6$ rel min at $x=?$

$$f'(x) = \frac{2}{3} \cdot 9x^{-\frac{1}{3}} + 3 = 0$$

$$\frac{6}{\sqrt[3]{x}} + 3 = 0$$

$$\frac{6}{\sqrt[3]{x}} = -3$$

$$6 = -3\sqrt[3]{x}$$

$$-2 = \sqrt[3]{x}$$

$$-8 = x$$

$$f''(x) = -\frac{1}{3} \cdot \frac{2}{3} \cdot 9\, x^{-4/3} \Big|_{x=-8} < 0$$

$x = 0$

f' + 0 - - * +

-8 0

max at $x=-8$

min at $x=0$

Apr 12-8:12 AM

Review 21 Improper integrals

$$\int_0^{\infty} xe^{-x}\,dx$$

$$\lim_{b\to\infty} \int_0^b xe^{-x}\,dx$$

$x \quad + \quad e^{-x}$

$1 \quad - \quad -e^{-x}$

$0 \quad\quad e^{-x}$

$$\lim_{b\to\infty} -xe^{-x} - e^{-x} \Big|_0^b$$

$$\lim_{b\to\infty} \left(\frac{-b}{e^b} - \frac{1}{e^b}\right) - (0-1) = 1$$

Apr 12-8:21 AM

$$\int_0^1 \frac{1}{x-1}\,dx$$

$$\lim_{b\to 1^-} \int_0^b \frac{1}{x-1}\,dx$$

$$\lim_{b\to 1^-} \ln|x-1| \Big|_0^b$$

$$\lim_{b\to 1^-} \ln|b-1| - \ln|0-1|$$

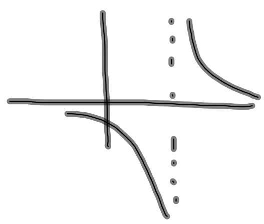
$$-\infty - 0$$

diverges

Apr 12-8:30 AM

$$\int_0^2 \frac{1}{x-1}\,dx$$

Improper at $x = 1$



$$\int_0^1 \frac{1}{x-1}\,dx + \int_1^2 \frac{1}{x-1}\,dx$$

$$-\infty + \infty$$

diverges

Apr 12-8:35 AM

does

$$\int_1^\infty \frac{1}{x^3+1}\,dx \quad \text{converge or diverge?}$$

$$0 \le \int_1^\infty \frac{1}{x^3+1}\,dx < \int_1^\infty \frac{1}{x^3}\,dx$$

$$\lim_{b\to\infty} \int_1^b x^{-3}\,dx$$

$$\lim_{b\to\infty} \left.\frac{x^{-2}}{-2}\right|_1^b$$

$$\lim_{b\to\infty} -\frac{1}{2b^2} - -\frac{1}{2\cdot 1^2} = \frac{1}{2}$$

Apr 12-8:38 AM